

**Active Duty – U.S. Army  
Noise Induced Hearing Injury  
Surveillance  
Calendar Years 2007-2011**

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2013



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# Active Duty – U.S. Army Noise Induced Hearing Injury Surveillance Calendar Years 2007-2011

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EXECUTIVE SUMMARY

PURPOSE:

Since 2010, the Department of Defense (DOD) Hearing Conservation Working Group, the Army Institute of Public Health (AIPH) of the U.S. Army Public Health Command (USAPHC), the Armed Forces Health Surveillance Center (AFHSC) and recently, the Hearing Center of Excellence (HCE) collaborated to develop new DOD and individual Services' NIHI surveillance data. The purposes of these data summaries are as follows:

- To present and summarize available Army medical surveillance data for use in noise-induced hearing injury (NIHI) prevention program and policy planning, including -
  - Defining the relative impact of NIHI among U.S. Army Active Duty personnel in the total Army and at individual Army installations.
  - Providing Army injury rates and trends from 2007–2011.
  - Identifying demographics most closely associated with NIHI incidence.
- To monitor progress-based metrics for reducing the NIHI morbidity burden over time.

This first NIHI data summary establishes a baseline against which future years' data can be compared for assessment of NIHI trends as prevention performance indicators.

CONCLUSIONS:

The Army NIHI surveillance annual summary for calendar years (CY) 2007-2011 showed increasing incidence rates for sensorineural hearing loss (SNHL), tinnitus, and significant threshold shift (STS). These results imply need for modifications to NIHI prevention strategies and continued monitoring for improvements (reductions) in NIHI incidence rates over time.

RECOMMENDATIONS:

Commanders and Preventive Medicine (PM) assets at multiple levels should use NIHI data summaries trends to maintain situational awareness of the progress of NIHI prevention operations. Using the periodic NIHI data summaries, Commanders and PM assets should adjust and improve prevention plans when the need is indicated from the outcomes data trends.

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REFERENCES:

References are listed in Appendix A.

PURPOSE:

- To present and summarize available Army medical surveillance data for use in NIHI prevention program and policy planning, including -
  - Defining the relative impact of NIHI among U.S. Army Active Duty personnel in the total Army and at individual Army installations.
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  - Identifying demographics most closely associated with NIHI.
- To monitor progress-based metrics for reducing the NIHI morbidity burden over time.

AUTHORITY:

Under Army Regulation (AR) 40-5, Section 2-19, the U.S. Army Public Health Command (USAPHC) is responsible for providing support for Army PM assets to include review and interpretation of surveillance data and identification and characterization of health problems as a foundation for injury prevention planning and policy efforts.

Under DoD Instruction 6055.12, Hearing Conservation Program, Enclosure 2, Section 3 requires the heads of the DOD components to annually evaluate the effectiveness of their Hearing Conservation Programs (HCPs).

Under Department of Defense Directive (DODD) 6490-02E Comprehensive Health Surveillance, 2012; Section 1 paragraph c. establishes the Armed Forces Health Surveillance Center (AFHSC) as the single source for DOD-level health surveillance information.

Under DODD 6200.04 Force Health Protection, Section 4.3.1.2, requires DOD components to promote and improve the health of the force through programs on injury prevention.

## BACKGROUND:

The World Health Organization describes public health surveillance as “the continuous, systematic collection, analysis and interpretation of health-related data needed for the planning, implementation, and evaluation of public health practice” (World Health Organization, 2013). By definition, surveillance systems include the capacity for data collection and analysis, as well as the timely dissemination of information to persons or groups of persons who can undertake effective prevention and control interventions related to specific health outcomes.

In 2006, an Institute of Medicine (IOM) report (Humes, et al) estimated the prevalence of noise-induced hearing loss (NIHL) and tinnitus among U.S. military members from World War II through 2005. The report’s authors concluded that military hearing conservation programs (HCPs) had not adequately protected the hearing of U.S. Service members. They recommended using prospective, longitudinal, epidemiological data to reliably estimate the incidence of NIHL and tinnitus in the U.S. Armed Forces.

In response to the IOM report, military audiologists and their Department of Veterans Affairs (VA) counterparts worked to develop a public health approach for monitoring and improving the effectiveness of HCPs. This collaboration produced a standard set of Military Health System (MHS) ICD-9-CM coding guidelines designed to improve the quality of data used for reporting and tracking incidence rates of noise-induced hearing injury (NIHI). The NIHI ICD-9 code “watch list” has evolved over time based on a series of data mining studies of Military Health System clinical data (See Appendix A).

A public health approach to injury prevention in the military first involves utilizing data to define the magnitude and scope of injuries. Ongoing analysis of surveillance data is essential for monitoring injury trends and detecting unexpected changes in injury occurrence. The AFHSC operates the Defense Medical Surveillance System (DMSS); which is the central repository of all inpatient and outpatient medical encounters used for disease and injury surveillance of U.S. military personnel.

Figure 1 presents the public health process (Petrucelli & Knapik, 2006). The five elements of the public health process necessary to make continued progress toward prevention of disease and injury are: (1) surveillance; (2) basic epidemiological studies; (3) systematic review of intervention studies; (4) program and policy implementation; and (5) evaluation of implemented strategies, programs, and policies.

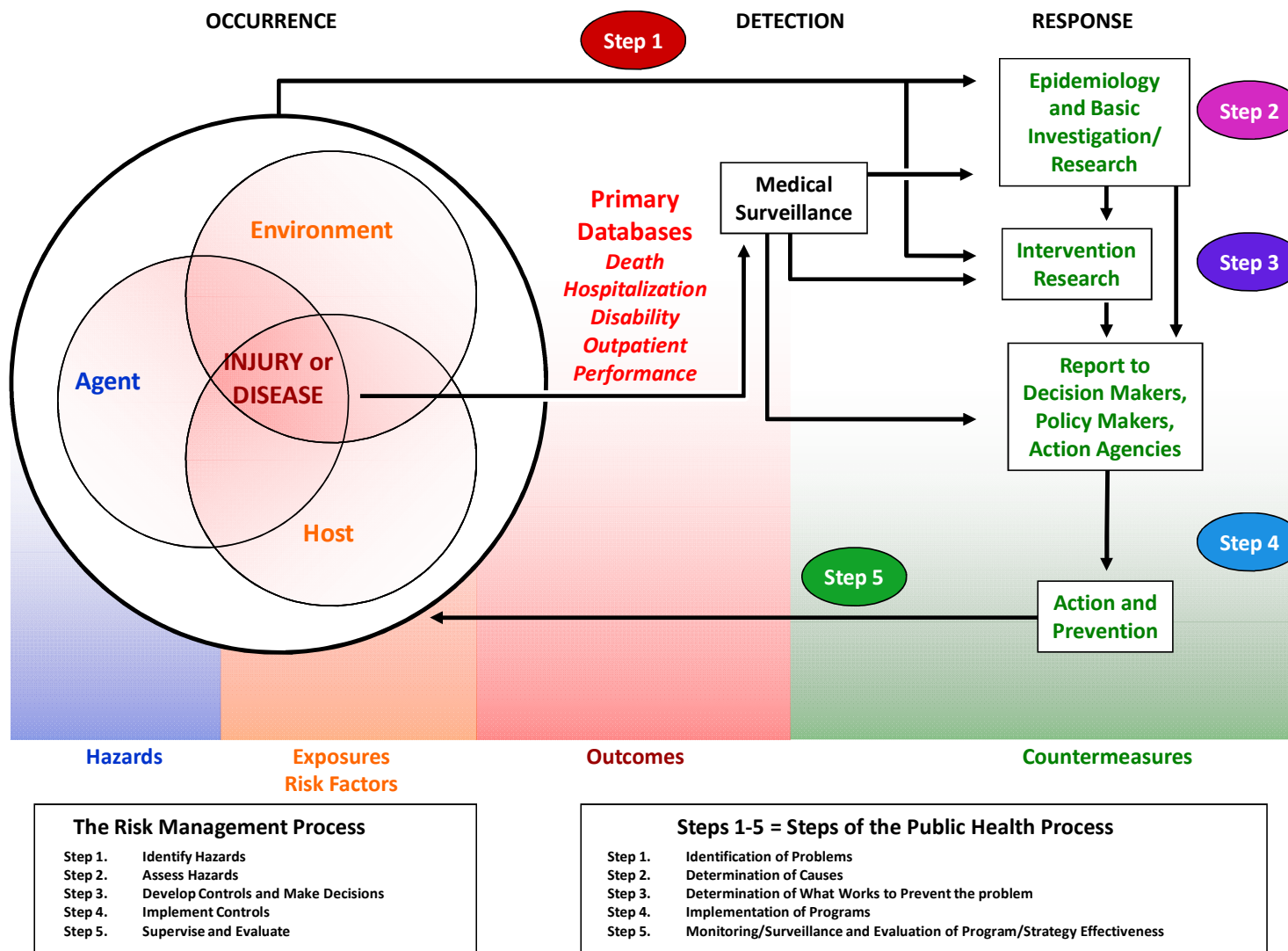


Figure 1. Steps of the Public Health Process

Starting in 2010 the DOD Hearing Conservation Working Group, the Army Institute of Public Health (AIPH), and recently, the Hearing Center of Excellence (HCE) collaborated with AFHSC to develop new DOD and individual Services' NIHI surveillance capabilities.

Multidisciplinary subject matter experts (SMEs) at AIPH and AFHSC collaborated to develop the new Army NIHI data tables. The AIPH SMEs included 1) Army Hearing Program audiology, 2) Injury Prevention Program epidemiology and preventive medicine, 3) PHC command statisticians and 4) clinical and statistical data managers. The AFHSC SMEs included 1) public health data managers and 2) analysts.

The new data summaries were based on existing AFHSC-AIPH injury reports for musculoskeletal and traumatic injuries for DOD, individual Services, and installations of individual Services. The new NIHI data summaries are modeled on the AIPH Injury Prevention Program's recurring injury reports format and philosophy of data utilization to improve prevention processes' performance using outcome metrics to drive change. The new data summaries are intended to provide a non-punitive means to track hearing health indicators for commanders and occupational health and PM assets at multiple levels for their situational awareness and to inform their hearing loss prevention programs' progress.

Background and published references for the selection of the NIHI code groups coming under surveillance from the DMSS can be found on AFHSC's web page under the surveillance case definitions tab at <http://www.afhsc.mil/caseSurveillanceDefs>.

Because of this collaboration, surveillance systems at the AFHSC and the AIPH will now be able to provide recurring data summaries that should be utilized by public health personnel and Commanders to identify hearing injury occurrences and to be alerted to emerging injury problems.

## METHODS:

### Data Delivery:

The Army NIHI data received at AIPH provided by AFHSC are in the same format as the data summaries for DOD and the other Services. Army data summaries are from Army data only. Transmission of annual NIHI data from AFHSC to AIPH and the other Services' surveillance hubs occurs in April of the following year.

AFHSC's DMSS data processing takes into account the following variables:

- Population: U.S. Army, Navy, Marines, and Air Force. Active component only.
- Surveillance period: Annual, covering a five year "moving window".
- Data source: inpatient, outpatient, and Theater Medical Data Store (TMDS) records.
- Denominator Adjustments: For reporting purposes AFHSC makes denominator adjustments to "person year" to exclude time lost to follow up (either from deployment, separation from service, retirement, demobilization, or death); usually expressed as "rate per 1,000 person years".

The year 2007 was selected as the starting reporting year because data quality objectives in the form of ICD-9 coding guidelines for NIHI were not attained until 2005 and it took 2 years before clinicians started using these guidelines more consistently in clinical practice.

### Data Description:

The relative burden of NIHI presented in this data summary is characterized by two indicators: (1) the total number of incident cases for each major diagnosis group (allows a person to be counted in more than one group) and (2) the number of individuals with one of a particular diagnosis from any of the major diagnosis groups (allows a person to only be counted only once).

Appendix B shows the 13 NIHI ICD-9 diagnostic codes in 4 diagnostic groups that comprise the NIHI case definition for AFHSC surveillance. These code groups include sensorineural hearing loss (SNHL), significant threshold shift (STS), noise-induced hearing loss (NIHL) and tinnitus. Appendix B also presents Current Procedural Terminology (CPT) codes and DOD occupation codes used in this data summary.

Appendix C provides annual Army data from 2007-2011 with data at the summary level by diagnostic group and at the installation level (stratified by DMIS ID) for each diagnostic group. An Army detail data table characterizes those with any NIHI by

occupation using DOD Occupation codes listed in Appendix B, as well as by sex, age, and deployment association. Individual Services occupation codes were combined to create the DOD military occupation codes based on those occupations across the Services that had the most closely associated work activities. The DOD consolidated codes are shown in Appendix B. An NIHI diagnosis was considered to be deployment associated if the diagnosis occurred during a deployment period or within 180 days of deployment.

Incident Cases: The NIHI data are presented as “incident cases”, meaning NEW cases only per reporting period (CY). A lifetime incidence rule was applied, and cases were censored (not counted again) after receiving an initial NIHI diagnosis. Service members (SMs) with more than one NIHI subgroup diagnosis were counted in EACH subgroup, but only once (lifetime) per subgroup in the Army diagnostic summary data table and installation level data tables. In the Army detail data table, SMs with more than one NIHI sub-group diagnosis were counted ONCE with the first qualifying diagnosis in order to avoid double counting of individuals when summarizing data for total NIHI. Therefore, the numbers in these two data tables will not match.

#### Statistical Analysis:

Statistical analysis was performed only on selected data from Appendix C. Each diagnosis group (SNHL, STS, NIHL, and Tinnitus) was analyzed using a regression model to determine the trend of incidence rates from 2007 to the current year. Statistical significance of a trend was defined using an  $\alpha = 0.05$ .

## RESULTS

Overall:

Analysis is provided for data from the Army Diagnostic Summary data table and Army Detail data table in Appendix C. No aggregate analysis was performed with the installation level data. Installation level data are provided for review by program managers as an aid to communication with unit commanders on their installation for their situational awareness and coordination of prevention activities planning and execution. No analysis was done on audiogram data.

Army Diagnostic Summary:

Overall, STS is the most common NIHI diagnosis in the Army with a 2011 lifetime incidence rate over 20 per 1000 p-yrs. SNHL and tinnitus had approximately the same incidence, approximately 15 per 1000 p-years. NIHL incidence is much lower with just over 2 cases per 1000 p-yrs.

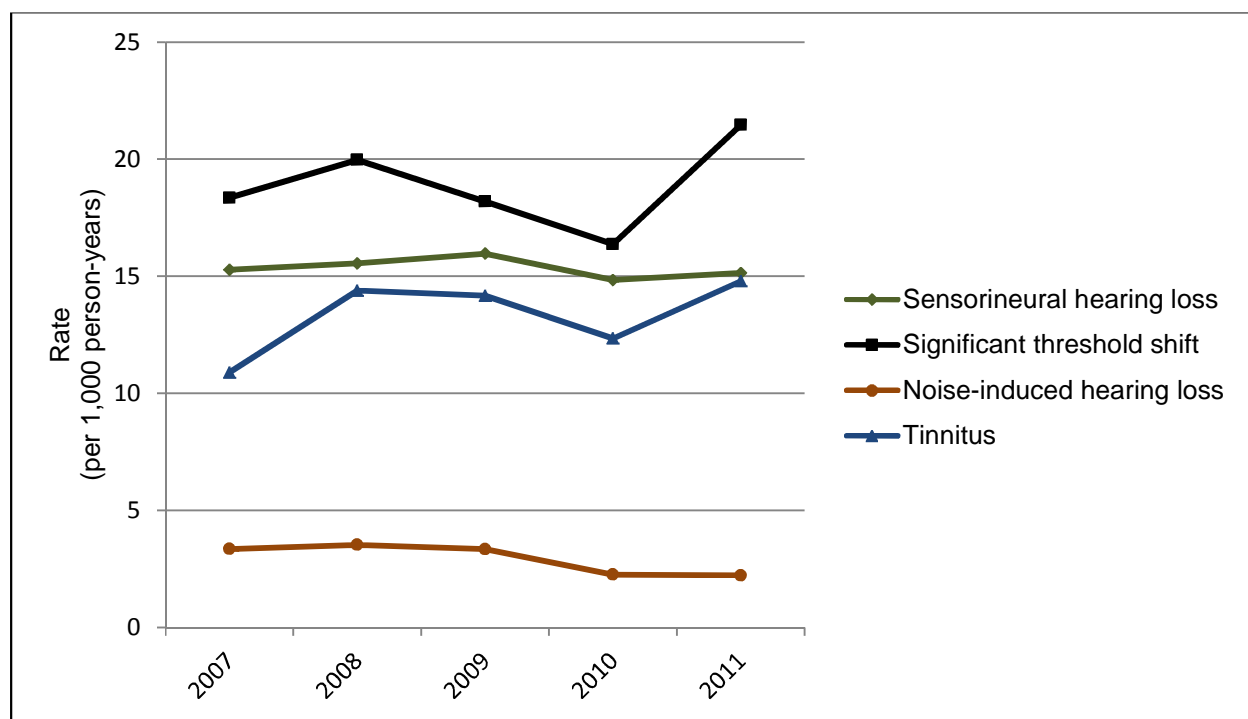


Figure 2. U.S. Army Noise-Induced Hearing Injuries

- The overall STS rate highly fluctuated between 2007 and 2011. This fluctuation however did not produce a significant increasing or decreasing trend ( $p=.730$ ). 2011's rate was the highest of all five years.
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- The SNHL rate slightly increased between 2007 and 2009 but overall had a fairly stable trend through the five years ( $p=.537$ ).
- The tinnitus rate highly fluctuated between 2007 and 2011. This fluctuation however did not product a significant increasing or decreasing trend ( $p=.336$ ). 2011's rate was the highest of all five years.
- The NIHL count and rate decreased between 2007 and 2011, but this decrease was not found to be statistically significant ( $p=.058$ ). Since the decrease in NIHL approached statistical significance, this trend may indicate possible improved performance. This would seem to be a positive performance indicator; however, the NIHL data have to be viewed with some skepticism. Clinicians have been reported to often use the broader SNHL diagnosis instead of the more specific NIHL diagnosis. So the incident cases of SNHL are the more important performance indicator vs. NIHL.

STS accounted for 35-40% of the total DoD NIHLs from 2007 to 2011. SNHL accounted for about 30% and tinnitus around 25-30%.

Table 1. Proportion of Total Army Diagnoses Counts by NIHL

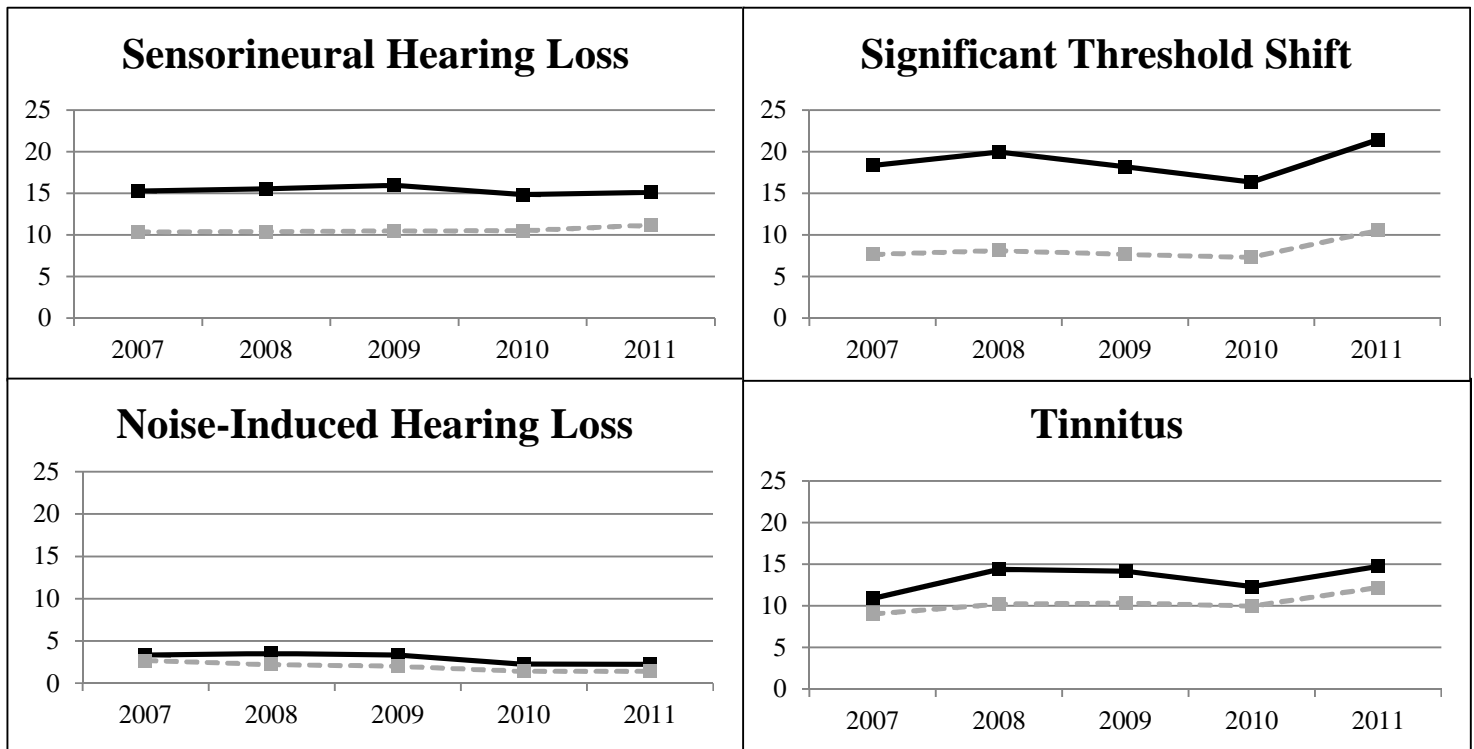
	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>
<b>SNHL</b>	31.4%	28.7%	30.5%	32.0%	28.0%
<b>STS</b>	38.7%	37.5%	35.2%	35.7%	39.8%
<b>NIHL</b>	7.1%	6.7%	6.6%	5.1%	4.3%
<b>Tinnitus</b>	22.8%	27.1%	27.6%	27.2%	27.9%
<b>Total</b>	100.0%	100.0%	100.0%	100.0%	100.0%

By count, the comparison of Army to DOD by NIHL diagnosis indicates that the Army owns the majority of these diagnoses. In fact, Army STS diagnoses account for the largest majority of DOD diagnoses with approximately 80-90% through the 5 years. The Army, however, only accounts for approximately 45-50% of the DOD tinnitus diagnoses. The Army's noise exposure burden are greater than the other services based on the overall numbers of people exposed in training activities and deployment (combat) exposures (with larger number of people). In addition the size of the Army is larger than those of the other Services; a comparison of totals between the DOD services will be highly dependent on the size of the Service and is not advisable.

Table 2. Army Diagnoses Counts as a Percent of DOD Diagnoses Counts

	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>
<b>SNHL</b>	54.9%	57.1%	58.6%	55.0%	52.8%
<b>STS</b>	89.1%	93.1%	90.6%	85.8%	78.5%
<b>NIHL</b>	47.0%	61.5%	64.5%	62.6%	62.6%
<b>Tinnitus</b>	45.3%	54.0%	53.0%	48.2%	47.6%

Compared to DOD, Army incidence rates for each diagnosis were also higher. Linear trend patterns for DOD mirrored those of the Army; increases and decreases over the 2007-2011 period were not statistically significant. Differences in rates are independent of population size.



Key: Solid line represents Army, dashed line represents DOD.

Figure 3. NIHI Incident Rate Comparison by Diagnosis: Army versus DOD

#### Army Demographic Detail:

- DOD Military Occupation Code Groups Data:

The Army occupation groups with the highest 2011 NIHI counts (proportion of total injuries in parenthesis) and rates were infantry, gun crew and seaman (31%); service, transport & supply (12%); communications and intelligence specialists (10%); electrical/mechanical equipment repairers (10%); and functional support and administration (9%). The incidence rate of the infantry, gun crew and seaman occupation group is double that of most of the officer occupation groups and 1.5 to 1.9 times the rate of the other enlisted groups.

- Army Gender Groups Comparisons Data:

The comparison of male to female Soldiers by counts and rates of NIHI are consistent with multiple studies. Males consistently have higher rates than females.

Males accounted for approximately 92% of the NIHIs through the 5 year span, but this may be a function of the military being predominantly male.

- Army Age Groups Comparisons Data

The comparison of age groups shows that the <20 yr old age group had the lowest rate of incident cases, and consistently accounted for less than 5% of the total number of NIHI cases. The 20-24 yr old age group consistently accounted for approximately 30% of the total number of NIHI cases through the 5 years. Overall, however, the highest incidence rates were in the 40+ age group whose rate was nearly double the other age groups over 20 and triple that of the under 20 group.

- Deployment Data:

The deployment association data are limited. Separate postdeployment NIHI and comorbidities studies are ongoing at the AIPH (See Appendix A).

## SUMMARY AND CONCLUSIONS:

This first Army NIHI data summary establishes baselines for counts and rates against which future annual data summaries can be compared. AFHSC and AIPH will continue to provide the data summaries to support NIHI prevention coordination and planning by Army PM assets and unit commanders at multiple levels. The counts and rates of NIHI “incident cases” are the principle prevention performance metrics. Incident cases are important because they represent cases that might have been prevented if prevention strategies and operations plans were effective.

Increasing rates of NIHI incident cases across time indicate the need to modify and adjust prevention strategies, plans, and activities. Decreases in NIHI rates across time or stabilization at constant low levels are positive prevention performance indicators. With such large populations, small changes may be identified as statistically significant. Program managers and PM assets should use these numbers along with professional judgment to determine the actual (meaningful) scope of problems, impact of interventions, etc.

Installations with large Table of Organization and Equipment (TOE) troop unit concentrations that show zero or very low NIHI rates appear to be unrealistic especially compared to other installations with similar troop numbers and unit types. This raises questions about the quality of input (coding accuracy and coding guidance). The counts and rates for the Regions show Southern Region with the highest NIHI counts and rates while Pacific Region shows the lowest counts and rates. The low rates may be an instance of under reporting NIHI. More investigation would be required to discover the source of these discrepancies. This may also explain why installation totals do not equal total on the summary pages.

The strengths of these data were the following: 1) the data received from AFHSC DMSS consisted of all medical encounters of active duty U.S. military personnel occurring in fixed (i.e., not temporary) military and civilian medical treatment facilities; 2) all medical encounters were subject to standardized and routine recordkeeping and coding; 3) the data collected came from a large patient population (approximately 1.3 million active duty personnel have access to MHS care); and 4) the data captured care received both within and outside the MHS (purchased care).

The limitations of the data included: 1) data on the troops deployed and receiving care in the theater of operations were limited in DMSS; 2) Guard and Reserve troop data are not included in the present data summaries, so prevalence of NIHI in these populations is unknown and the cost and reduced readiness burdens of NIHI in the Guard and Reserve are likewise unknown; 3) there is inability to assess exact causes of NIHI using medical data (i.e., exposure information is not available and cause-coding is not required in the medical data); 4) where the diagnoses were correct, the person entering the ICD-9-CM code(s) may misclassify the ICD-9-CM code(s); 5) the aggregation of NIHI ICD-9-CM codes blurs the distinction of different clinical outcomes tied to different exposures, e.g., steady noise vs. impulse noise of weapons firing or exposure to explosives during war operations.

Counts and rates of NIHI during the surveillance period were influenced by a number of factors. The increase in incident cases of SNHL, STS and tinnitus may be attributed to deployment related noise and blast exposures. The Army deployed the greatest number of troops during this period. Some were deployed multiple times.

For the Army, the increase in STS, though not significant, may tie to changes in hearing thresholds between pre-and post-deployment hearing tests. Pre- deployment monitoring audiometry has been mandated in the Army since September 2006 when the Medical Protection System's (MEDPROS) Hearing Readiness Module (HRM) was implemented and compliance with the required annual hearing tests increased as a result. In September 2006, these tests were recorded in MEDPROS-HRM based on audiometric records fed from the Defense Occupational Environmental Health Readiness System-Hearing Conservation (DOEHRS-HC) central audiometric data repository. At that same time many Soldiers also started receiving postdeployment hearing tests which became mandatory in January 2009.

The increasing incident rates of tinnitus, although not significant, could be due to the deployment exposures during this time period. Increasing rates of tinnitus in troop cohorts returning from deployment have been observed in separate studies of deployment related NIHI since 2005. Tinnitus and hearing loss are the VA's number one and two service related compensable disorders. These two together amount to over \$1B per annum in VA compensation costs. The compensation costs do not include the additional costs of hearing services like periodic hearing exams, hearing aids dispensed along with recurring hearing aid batteries supply and hearing aid maintenance and aural rehabilitation therapy.

The decrease in NIHL is not a significant change, yet it does closely approach significance. If the decrease had been significant that change would be viewed as a positive performance indicator; however, the NIHL data has to be viewed critically. Clinicians as first examiners of Soldier hearing loss cases are reported to often use the broader SNHL diagnosis instead of the more specific NIHL diagnosis associated with etiology of noise exposure.

While the Army's proportion of DOD NIHL counts is large due to its large population size in relation to the other Services, it is unclear why the incidence rates are also greater. This could be due to better and more thorough identification, reporting, and documentation, differentially increased risk experienced by Army SMs compared to SMs in other components, or actual increased rate of injuries. More investigation would be required to determine the cause of the difference.

High counts and rates among the infantry, gun crew and seaman occupation codes is likely due to higher exposures to impulse noise which can be more damaging than steady noise. Preventive measures include targeted health threat briefings, appropriate hearing protection device fittings and monitoring audiometry for changes in hearing. The Army combat arms occupation group counts and rates can serve as potential useful benchmarks for evaluating effectiveness of new hearing protective devices such as linear/non-linear earplugs and Tactical Communication and Protection Systems in comparison with future years' data.

The higher rates of the 20-24 year group vs. the <20 age group indicates that the earliest years of service mark a critical period for emphasizing to Soldiers the importance of taking personal action to prevent losing their hearing. Higher rates among Service members 40 years of age and older may be partially due to longer exposure than junior Service Members as well as presbycusis in the older cohort.

## RECOMMENDATIONS:

Interpretation of surveillance data should provide situational awareness and help identify and characterize hearing health problems as a foundation for NIHL prevention planning and execution at all levels.

PM assets at all levels should periodically review the data tables comparing their installation rates with the total Army and DOD rates. Future years' data can be compared to the baseline period data to help evaluate progress of HCP's in reducing NIHL. Observed future data trends may indicate a need for changes in preventative measures coordination, planning and execution. As changes in operations plans are executed, the data should be monitored to see if those changes lead to decrease in NIHL rates over time (year to year comparison).

Annual, pre- and post-deployment monitoring audiometry needs to continue for all troops with appropriate referrals for anyone showing significant shifts in hearing or tinnitus symptoms related to individual deployments.

Clinicians need to improve documentation of NIHI and hearing profiles in medical records and encourage precision coding of the ICD-9 data into healthcare databases at the point of service delivery. As per existing guidelines, NIHI prevention action plans should include the following:

- PM assets should maintain an inventory of noise hazardous areas and the units working in those areas as well as the specific noise hazard types to which troop units are exposed.
- PM should consult with commanders about the units' exposures and the need for monitoring hearing protection use and command emphasis on troops reporting for required annual audiometry and health education.
- TOE unit Soldiers in Active Duty, National Guard, and Reserve units should be fitted and issued the non-linear combat hearing protectors for training. This will allow for building confidence in this protective equipment that also enhances communication, and will provide protection from weapons-fire impulse noise.
- In addition to being issued hearing protection devices (HPD), Soldiers also need increased awareness, knowledge, and encouragement in employing hearing protective behaviors and strategies when noise exposed.
- Hearing conservation and readiness training for Soldiers should cover topics that include hazardous noise types; biological effects of noise hazard exposures; purpose of hearing protection devices (HPD); advantages and disadvantages of various HPDs; how to select, fit and use HPDs; and the importance of periodic audiometric testing. Annual training should also emphasize individual Soldier's responsibility for maintaining their auditory fitness for duty.
- Unit commanders should be held accountable for their units' hearing readiness status.
- Elevation of hearing conservation and readiness needs to be a special interest item to be evaluated during all Command safety assessments and Inspector General inspections.
- Tinnitus screening should be conducted for all Soldiers at the time of annual monitoring audiometry or periodic health assessment (PHA) or via pre- and post-deployment health (re-)assessments. Soldiers reporting tinnitus symptoms should be referred for follow up evaluation and treatment.

Compliance with these preventive measures should be systematically tracked and enforced to support their effectiveness with changes in NIHI trends.

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APPENDIX B  
INJURY DIAGNOSIS CODES (ICD-9-CM CODES)  
CATEGORIZATION BY DIAGNOSTIC GROUPS,  
CURRENT PROCEDURE TERMINOLOGY (CPT) CODES  
AND DOD OCCUPATION CODES  
USED IN THESE DATA SUMMARIES

ICD-9 Codes

	Category	Code	Code Description
SNHL	Sensorineural hearing loss	38910	SENSORINEURAL HEARING LOSS UNSPECIFIED
SNHL	Sensorineural hearing loss	38911	SENSORY HEARING LOSS
SNHL	Sensorineural hearing loss	38915	SENSORINEURAL HEARING LOSS, UNILATERAL
SNHL	Sensorineural hearing loss	38916	SENSORINEURAL HEARING LOSS, ASYMMETRICAL
SNHL	Sensorineural hearing loss	38917	SENSORY HEARING LOSS, UNILATERAL
SNHL	Sensorineural hearing loss	38918	SENSORINEURAL HEARING LOSS, BILATERAL
NIHL	Noise-induced hearing loss	38810	NOISE EFFECTS ON INNER EAR UNSPECIFIED
NIHL	Noise-induced hearing loss	38811	ACOUSTIC TRAUMA (EXPLOSIVE) TO EAR
NIHL	Noise-induced hearing loss	38812	NOISE-INDUCED HEARING LOSS
SHIFT	Significant threshold shift	79415	NONSPECIFIC ABNORMAL AUDITORY FUNCTION STUDIES
TINN	Tinnitus	38830	TINNITUS UNSPECIFIED
TINN	Tinnitus	38831	SUBJECTIVE TINNITUS
TINN	Tinnitus	38832	OBJECTIVE TINNITUS

CPT Codes Used in the Data Summaries

AUDIO	CPT codes	92552	PURE TONE AUDIOMETRY (THRESHOLD); AIR ONLY
AUDIO	CPT codes	92555	SPEECH AUDIOMETRY THRESHOLD;
AUDIO	CPT codes	92556	SPEECH AUDIOMETRY THRESHOLD; WITH SPEECH RECOGNITION
AUDIO	CPT codes	92557	COMPREHENSIVE AUDIOMETRY THRESHOLD EVALUATION AND SPEECH RECOGNITION
AUDIO	CPT codes	92559	AUDIOMETRIC TESTING OF GROUPS

DOD Occupation Codes used in the data summary

<b>NEW DOD Code</b>	<b>DOD CODE TITLE</b>
10	<i>Infantry, Gun Crew, and Seaman</i>
11	<i>Electronic Equipment Repairers</i>
12	<i>Communications and Intelligence Specialists</i>
13	<i>Health Care Specialists</i>
14	<i>Other Technical and Allied Specialists</i>
15	<i>Functional Support and Admin</i>
16	<i>Electrical/Mechanical Equipment Repairers</i>
17	<i>Craftswork &amp; Construction</i>
18	<i>Service, Transport &amp; Supply</i>
19	<i>Students &amp; Trainees (Enlisted)</i>
21	<i>General/Flag. Officers &amp; Executives</i>
22	<i>Tactical Operations Officers</i>
23	<i>Intelligence Officers</i>
24	<i>Engineering &amp; Maintenance Officers</i>
25	<i>Scientists &amp; Professionals</i>
26	<i>Health Care Officers</i>
27	<i>Administrators</i>
28	<i>Supply &amp; Logistics Officers</i>
29	<i>Students, Trainees &amp; Other Officers</i>

**APPENDIX C**  
**TOTAL ARMY ANNUAL DATA DETAILS**

**UPDATED ANNUALLY IN MAY OF THE YEAR FOLLOWING THE LAST YEAR  
CITED IN THE DATA SUMMARY**

**US Army Noise-Induced Hearing Injuries, by diagnosis, 2007-2011**

	2007		2008		2009		2010		2011	
	ANNUAL		ANNUAL		ANNUAL		ANNUAL		ANNUAL	
	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>
Count (Rate <sup>1</sup> )										
Sensorineural hearing loss	7,470	15.28	7,878	15.54	8,269	15.96	7,838	14.84	8,015	15.13
Significant threshold shift	9,225	18.35	10,311	19.97	9,553	18.19	8,730	16.37	11,405	21.45
Noise-induced hearing loss	1,682	3.35	1,845	3.53	1,797	3.35	1,241	2.26	1,232	2.22
Tinnitus	5,440	10.89	7,449	14.39	7,492	14.17	6,660	12.34	8,004	14.79

**US Armed Forces(DoD) Noise-Induced Hearing Injuries, Active Component, by diagnosis, 2007-2011**

	2007		2008		2009		2010		2011	
	ANNUAL		ANNUAL		ANNUAL		ANNUAL		ANNUAL	
	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>
Sensorineural hearing loss	13,613	10.37	13,790	10.39	14,117	10.48	14,259	10.50	15,172	11.22
Significant threshold shift	10,352	7.67	11,076	8.14	10,544	7.65	10,175	7.34	14,532	10.55
Noise-induced hearing loss	3,575	2.68	3,001	2.22	2,787	2.02	1,981	1.42	1,969	1.41
Tinnitus	12,016	8.99	13,782	10.21	14,144	10.33	13,807	10.02	16,807	12.25

1. A person can be counted in more than one diagnosis type, but only once (life-time) for each. Rate is provided per 1,000 person-years.

2. Includes only data through the last available full quarter

Source: Defense Medical Surveillance System (DMSS) as of 21-NOV-2014

Prepared by Armed Forces Health Surveillance Center (AFHSC) as of 02-DEC-2014

**US Army SENSORINEURAL HEARING LOSS diagnoses, 2007-2011**

	2007		2008		2009		2010		2011	
	ANNUAL		ANNUAL		ANNUAL		ANNUAL		ANNUAL	
	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>
<b>NORTHERN</b>										
<i>Aberdeen Proving Ground, MD</i>	45	18.37	20	13.87	11	8.32	13	10.77	24	21.61
<i>Fort Belvoir, VA</i>	32	16.60	38	21.10	36	19.15	30	13.93	24	9.15
<i>Fort Bragg, NC</i>	415	9.51	491	10.75	472	10.02	404	8.29	488	10.20
<i>Fort Detrick, MD</i>	5	6.58	9	12.74	15	20.74	10	13.33	13	14.69
<i>Fort Dix, NJ</i>	1	14.11	2	20.36	1	12.99	4	27.23	14	53.18
<i>Fort Drum, NY</i>	283	17.57	279	16.68	243	14.09	206	11.63	282	15.28
<i>Fort Eustis, VA</i>	37	6.96	47	8.13	106	17.51	39	6.34	31	5.48
<i>Fort George G Meade, MD</i>	19	7.67	48	16.50	70	24.15	43	14.47	32	11.03
<i>Fort Knox, KY</i>	213	27.97	201	26.57	78	9.84	195	18.07	176	17.01
<i>Fort Lee, VA</i>	36	5.92	44	7.00	38	6.18	56	8.59	53	7.77
<i>Fort Myer, VA</i>	17	10.68	13	7.94	25	14.73	13	7.73	10	5.48
<i>Fort Monmouth, NJ</i>	5	10.72	1	2.39	3	7.80	1	3.04	2	10.13
<i>Walter Reed AMC, DC</i>	39	15.34	40	15.26	43	16.38	30	12.06	13	8.38
<i>West Point USMA, NY</i>	15	11.92	19	14.48	30	22.74	16	12.49	15	10.88
<b>SOUTHERN</b>										
<i>Fort Benning, GA</i>	441	23.79	582	29.41	509	24.77	447	22.01	339	15.76
<i>Fort Campbell, KY</i>	392	13.67	315	10.38	399	12.86	393	12.71	588	18.15
<i>Fort Gordon, GA</i>	73	9.29	79	9.46	103	11.52	82	9.24	85	10.74
<i>Fort Hood, TX</i>	681	13.37	885	17.03	630	12.22	549	12.04	476	10.51
<i>Fort Jackson, SC</i>	251	27.08	193	17.25	254	23.89	169	17.65	145	17.61
<i>Fort McPherson, GA</i>	26	18.34	25	17.31	27	17.44	29	19.98	19	35.14
<i>Fort Polk, LA</i>	197	27.99	123	15.52	196	23.77	237	27.43	242	28.56
<i>Fort Rucker, AL</i>	77	19.60	105	26.84	108	27.98	79	21.83	61	17.32
<i>Fort Sam Houston, TX</i>	92	13.30	103	14.49	109	14.74	89	11.44	105	13.69
<i>Fort Sill, OK</i>	51	4.23	123	10.95	158	14.97	192	14.58	103	8.70
<i>Fort Stewart, GA</i>	263	17.29	160	10.51	336	20.44	192	11.28	264	14.65
<i>Redstone Arsenal, AL</i>	15	15.77	10	10.60	12	11.12	12	9.85	14	13.34
<b>WESTERN</b>										
<i>Fort Bliss, TX</i>	146	10.40	264	16.58	470	25.83	483	24.05	528	22.01
<i>Fort Carson, CO</i>	298	19.60	245	14.57	309	15.97	300	12.98	351	13.89
<i>Fort Huachuca, AZ</i>	99	18.84	31	6.76	27	5.92	32	6.29	32	6.53
<i>Fort Irwin, CA</i>	17	4.18	36	9.07	50	12.48	39	9.17	61	14.32
<i>Fort Leavenworth, KS</i>	22	8.53	28	10.58	34	11.87	53	17.07	47	15.27
<i>Fort Leonard Wood, MO</i>	122	12.02	205	19.11	240	22.23	284	27.23	290	28.36
<i>Fort Lewis, WA</i>	484	19.90	534	19.52	552	18.71	410	13.48	490	16.13
<i>Fort Richardson, AK</i>	45	8.82	186	27.42	113	14.65	298	42.38	163	24.58
<i>Fort Riley, KS</i>	416	30.54	493	36.31	355	23.21	438	24.78	442	24.65
<i>Fort Wainwright, AK</i>	58	11.00	70	17.52	68	14.82	79	18.24	98	15.84
<b>PACIFIC</b>										
<i>Camp Carroll</i>	6	12.30	1	1.40	5	6.70	5	7.25	6	8.86
<i>Camp Casey</i>	31	5.49	18	3.20	40	6.78	15	2.68	23	4.42
<i>Camp Humphreys</i>	3	2.03	5	3.17	12	7.59	14	7.70	17	5.68
<i>Camp Long</i>	3	13.20	0	0.00	1	14.96	0	0.00	1	60.36
<i>Camp Stanley/Red Cloud</i>	0	0.00	3	10.16	2	5.06	0	0.00	1	9.55
<i>Japan</i>	9	17.48	1	1.65	13	18.34	10	14.55	6	8.29
<i>Schofield Barracks-Wheeler AAF</i>	449	33.42	483	33.73	568	37.65	503	33.28	563	34.93
<i>USA Hawaii</i>	16	49.45	5	24.75	5	24.31	5	21.72	5	19.93
<i>Yongsan Garrison</i>	28	7.74	23	6.33	30	8.36	44	11.75	47	10.24
<b>EUROPEAN</b>										
<i>Ansbach</i>	4	3.09	1	0.61	10	5.68	1	0.64	7	5.40
<i>Baden-Wuerttemberg</i>	91	13.52	42	6.93	55	9.93	47	10.79	55	12.33
<i>Bamberg</i>	29	11.25	4	2.08	24	11.51	54	24.85	79	22.39
<i>BeNeLux</i>	10	11.41	8	10.41	7	9.51	4	6.75	2	3.30
<i>Grafenwoehr</i>	19	13.64	20	8.77	17	5.44	33	14.38	32	13.41
<i>Kaiserslautern</i>	1	7.28	0	0.00	1	7.26	1	7.68	1	7.49
<i>Schweinfurt</i>	19	5.78	17	7.30	16	4.17	50	16.67	61	17.14
<i>Stuttgart</i>	0	0.00	2	29.85	1	6.07	2	27.73	1	5.57
<i>Vicenza</i>	22	9.01	47	17.05	87	35.68	18	7.29	50	18.99
<i>Wiesbaden</i>	24	12.09	12	6.73	12	7.62	17	10.30	21	11.33

1. Rate is provided per 1,000 person-years.

**US Army SIGNIFICANT THRESHOLD SHIFT diagnoses, 2007-2011**

	2007		2008		2009		2010		2011	
	ANNUAL		ANNUAL		ANNUAL		ANNUAL		ANNUAL	
	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>
<b>NORTHERN</b>										
<i>Aberdeen Proving Ground, MD</i>	38	15.11	15	10.16	11	8.12	37	30.22	56	49.62
<i>Fort Belvoir, VA</i>	2	0.98	2	1.05	2	1.00	1	0.44	9	3.24
<i>Fort Bragg, NC</i>	826	18.49	840	18.17	1,393	29.54	906	18.73	1,234	26.14
<i>Fort Detrick, MD</i>	3	3.79	0	0.00	6	7.85	1	1.27	0	0.00
<i>Fort Dix, NJ</i>	0	0.00	0	0.00	0	0.00	1	6.28	6	21.49
<i>Fort Drum, NY</i>	0	0.00	2	0.11	8	0.44	9	0.49	13	0.68
<i>Fort Eustis, VA</i>	141	26.06	0	0.00	4	0.64	3	0.47	2	0.34
<i>Fort George G Meade, MD</i>	45	17.94	98	33.21	86	29.71	67	22.69	33	11.36
<i>Fort Knox, KY</i>	282	35.80	20	2.55	25	3.07	23	2.12	16	1.52
<i>Fort Lee, VA</i>	2	0.32	1	0.16	7	1.12	141	21.41	206	30.43
<i>Fort Myer, VA</i>	2	1.21	0	0.00	9	5.13	14	8.09	9	4.82
<i>Fort Monmouth, NJ</i>	0	0.00	0	0.00	0	0.00	1	2.97	0	0.00
<i>Walter Reed AMC, DC</i>	2	0.74	1	0.36	2	0.72	2	0.76	2	1.22
<i>West Point USMA, NY</i>	20	15.04	2	1.46	0	0.00	0	0.00	1	0.70
<b>SOUTHERN</b>										
<i>Fort Benning, GA</i>	7	0.37	2	0.10	154	7.22	39	1.85	9	0.41
<i>Fort Campbell, KY</i>	1	0.03	5	0.16	173	5.36	234	7.31	683	20.47
<i>Fort Gordon, GA</i>	0	0.00	0	0.00	9	0.98	0	0.00	138	17.06
<i>Fort Hood, TX</i>	4,395	87.31	4,778	98.54	4,014	85.93	3,249	79.88	1,372	33.58
<i>Fort Jackson, SC</i>	3	0.32	9	0.79	11	1.01	2	0.20	5	0.59
<i>Fort McPherson, GA</i>	0	0.00	1	0.65	4	2.46	0	0.00	3	5.19
<i>Fort Polk, LA</i>	2	0.27	3	0.36	5	0.57	6	0.66	3	0.34
<i>Fort Rucker, AL</i>	3	0.73	140	34.12	305	78.15	101	28.07	14	3.94
<i>Fort Sam Houston, TX</i>	111	15.39	97	13.24	107	14.09	131	16.54	127	16.36
<i>Fort Sill, OK</i>	226	18.51	61	5.37	7	0.65	4	0.30	3	0.25
<i>Fort Stewart, GA</i>	512	33.07	1,403	94.18	598	37.87	663	40.45	791	45.78
<i>Redstone Arsenal, AL</i>	0	0.00	0	0.00	1	0.88	1	0.79	2	1.81
<b>WESTERN</b>										
<i>Fort Bliss, TX</i>	374	26.27	336	21.02	606	33.22	442	21.85	1,734	73.45
<i>Fort Carson, CO</i>	15	0.93	8	0.45	15	0.74	32	1.34	152	5.82
<i>Fort Huachuca, AZ</i>	28	5.19	0	0.00	4	0.85	6	1.16	23	4.64
<i>Fort Irwin, CA</i>	2	0.48	0	0.00	4	0.98	5	1.16	5	1.16
<i>Fort Leavenworth, KS</i>	0	0.00	2	0.72	13	4.34	3	0.93	8	2.51
<i>Fort Leonard Wood, MO</i>	12	1.15	6	0.54	18	1.61	14	1.30	12	1.12
<i>Fort Lewis, WA</i>	1,433	58.40	1,962	73.93	1,279	45.09	1,856	64.07	3,692	133.84
<i>Fort Richardson, AK</i>	4	0.76	0	0.00	1	0.12	2	0.27	88	12.56
<i>Fort Riley, KS</i>	12	0.83	4	0.28	2	0.12	2	0.11	36	1.89
<i>Fort Wainwright, AK</i>	10	1.87	0	0.00	2	0.42	7	1.56	12	1.87
<b>PACIFIC</b>										
<i>Camp Carroll</i>	1	2.00	0	0.00	1	1.31	3	4.28	5	7.26
<i>Camp Casey</i>	0	0.00	0	0.00	35	5.85	4	0.71	3	0.57
<i>Camp Humphreys</i>	0	0.00	0	0.00	2	1.24	1	0.54	2	0.66
<i>Camp Long</i>	6	26.01	0	0.00	0	0.00	0	0.00	0	0.00
<i>Camp Stanley/Red Cloud</i>	0	0.00	0	0.00	2	5.00	0	0.00	0	0.00
<i>Japan</i>	0	0.00	0	0.00	3	4.05	1	1.40	0	0.00
<i>Schofield Barracks-Wheeler AAF</i>	1	0.07	1	0.06	3	0.18	93	5.72	67	3.89
<i>USA Hawaii</i>	1	2.85	0	0.00	0	0.00	0	0.00	0	0.00
<i>Yongsan Garrison</i>	4	1.08	0	0.00	3	0.81	28	7.34	21	4.52
<b>EUROPEAN</b>										
<i>Ansbach</i>	0	0.00	0	0.00	2	1.11	11	6.89	1	0.77
<i>Baden-Wuerttemberg</i>	49	7.05	20	3.21	9	1.58	6	1.34	1	0.22
<i>Bamberg</i>	12	4.55	43	22.05	1	0.48	0	0.00	2	0.55
<i>BeNeLux</i>	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
<i>Grafenwoehr</i>	1	0.70	1	0.43	6	1.87	2	0.85	1	0.41
<i>Kaiserslautern</i>	0	0.00	0	0.00	0	0.00	0	0.00	1	7.27
<i>Schweinfurt</i>	0	0.00	0	0.00	1	0.26	3	0.98	0	0.00
<i>Stuttgart</i>	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
<i>Vicenza</i>	177	74.38	3	1.12	134	55.25	117	47.74	151	59.85
<i>Wiesbaden</i>	1	0.49	0	0.00	1	0.62	10	5.94	1	0.53

1. Rate is provided per 1,000 person-years.

**US Army Noise-Induced HEARING LOSS diagnoses, 2007-2011**

	2007		2008		2009		2010		2011	
	ANNUAL		ANNUAL		ANNUAL		ANNUAL		ANNUAL	
	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>
<b>NORTHERN</b>										
<i>Aberdeen Proving Ground, MD</i>	7	2.78	1	0.67	0	0.00	0	0.00	3	2.51
<i>Fort Belvoir, VA</i>	2	1.00	3	1.60	3	1.51	4	1.75	2	0.71
<i>Fort Bragg, NC</i>	350	7.94	443	9.59	252	5.26	327	6.57	354	7.22
<i>Fort Detrick, MD</i>	0	0.00	0	0.00	0	0.00	0	0.00	1	1.06
<i>Fort Dix, NJ</i>	0	0.00	0	0.00	2	23.79	1	6.17	3	10.38
<i>Fort Drum, NY</i>	10	0.60	20	1.15	29	1.61	11	0.59	19	0.99
<i>Fort Eustis, VA</i>	1	0.18	8	1.35	14	2.23	40	6.28	12	2.05
<i>Fort George G Meade, MD</i>	3	1.19	2	0.67	3	1.00	3	0.97	0	0.00
<i>Fort Knox, KY</i>	21	2.66	6	0.76	5	0.60	8	0.71	10	0.92
<i>Fort Lee, VA</i>	3	0.49	2	0.31	9	1.43	27	4.05	8	1.14
<i>Fort Myer, VA</i>	2	1.25	0	0.00	2	1.17	0	0.00	0	0.00
<i>Fort Monmouth, NJ</i>	0	0.00	1	2.33	0	0.00	1	2.96	0	0.00
<i>Walter Reed AMC, DC</i>	5	1.86	3	1.09	0	0.00	0	0.00	2	1.20
<i>West Point USMA, NY</i>	2	1.52	5	3.66	6	4.38	2	1.50	3	2.08
<b>SOUTHERN</b>										
<i>Fort Benning, GA</i>	16	0.84	56	2.74	59	2.76	37	1.75	27	1.20
<i>Fort Campbell, KY</i>	197	6.71	169	5.43	265	8.31	216	6.79	11	0.33
<i>Fort Gordon, GA</i>	3	0.37	5	0.58	2	0.22	1	0.11	0	0.00
<i>Fort Hood, TX</i>	306	5.92	291	5.48	266	5.01	87	1.85	27	0.57
<i>Fort Jackson, SC</i>	9	0.95	40	3.51	35	3.22	19	1.93	18	2.12
<i>Fort McPherson, GA</i>	3	2.04	5	3.33	1	0.62	3	1.95	0	0.00
<i>Fort Polk, LA</i>	2	0.27	5	0.60	11	1.26	58	6.36	175	19.45
<i>Fort Rucker, AL</i>	5	1.23	4	0.98	3	0.73	2	0.52	0	0.00
<i>Fort Sam Houston, TX</i>	6	0.84	4	0.54	2	0.26	3	0.37	3	0.37
<i>Fort Sill, OK</i>	57	4.63	14	1.22	64	5.89	43	3.17	5	0.41
<i>Fort Stewart, GA</i>	77	4.90	3	0.19	7	0.41	4	0.22	9	0.48
<i>Redstone Arsenal, AL</i>	0	0.00	1	1.01	2	1.78	1	0.79	0	0.00
<b>WESTERN</b>										
<i>Fort Bliss, TX</i>	20	1.39	81	4.93	103	5.44	29	1.37	24	0.95
<i>Fort Carson, CO</i>	35	2.21	58	3.31	51	2.53	44	1.82	102	3.86
<i>Fort Huachuca, AZ</i>	5	0.93	4	0.85	1	0.21	1	0.19	0	0.00
<i>Fort Irwin, CA</i>	9	2.17	13	3.20	19	4.62	8	1.82	5	1.13
<i>Fort Leavenworth, KS</i>	2	0.75	5	1.81	7	2.33	7	2.14	9	2.77
<i>Fort Leonard Wood, MO</i>	176	17.35	181	16.83	279	25.58	31	2.90	144	13.51
<i>Fort Lewis, WA</i>	24	0.95	15	0.53	10	0.32	4	0.12	8	0.25
<i>Fort Richardson, AK</i>	21	4.04	23	3.30	17	2.12	14	1.88	3	0.42
<i>Fort Riley, KS</i>	29	2.03	108	7.52	48	2.96	7	0.37	11	0.58
<i>Fort Wainwright, AK</i>	24	4.45	13	3.16	10	2.10	9	1.99	12	1.85
<b>PACIFIC</b>										
<i>Camp Carroll</i>	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
<i>Camp Casey</i>	2	0.35	6	1.05	0	0.00	2	0.35	7	1.31
<i>Camp Humphreys</i>	0	0.00	1	0.62	2	1.24	2	1.08	5	1.63
<i>Camp Long</i>	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
<i>Camp Stanley/Red Cloud</i>	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
<i>Japan</i>	0	0.00	1	1.59	0	0.00	0	0.00	0	0.00
<i>Schofield Barracks-Wheeler AAF</i>	9	0.64	8	0.52	23	1.41	14	0.86	21	1.20
<i>USA Hawaii</i>	1	2.90	0	0.00	3	12.72	3	11.51	1	3.57
<i>Yongsan Garrison</i>	0	0.00	2	0.54	0	0.00	8	2.07	11	2.31
<b>EUROPEAN</b>										
<i>Ansbach</i>	0	0.00	0	0.00	0	0.00	0	0.00	1	0.76
<i>Baden-Wuerttemberg</i>	9	1.31	9	1.45	5	0.88	4	0.89	1	0.21
<i>Bamberg</i>	2	0.76	3	1.53	3	1.41	1	0.44	5	1.35
<i>BeNeLux</i>	0	0.00	2	2.51	1	1.31	1	1.63	0	0.00
<i>Grafenwoehr</i>	5	3.51	2	0.85	1	0.31	0	0.00	2	0.81
<i>Kaiserslautern</i>	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
<i>Schweinfurt</i>	6	1.79	6	2.53	0	0.00	2	0.65	1	0.27
<i>Stuttgart</i>	0	0.00	0	0.00	0	0.00	0	0.00	1	5.25
<i>Vicenza</i>	9	3.63	9	3.20	16	6.29	3	1.16	7	2.53
<i>Wiesbaden</i>	0	0.00	3	1.64	1	0.62	2	1.17	0	0.00

1. Rate is provided per 1,000 person-years.

**US Army TINNITUS diagnoses, 2007-2011**

	2007		2008		2009		2010		2011	
	ANNUAL		ANNUAL		ANNUAL		ANNUAL		ANNUAL	
	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>
<b>NORTHERN</b>										
<i>Aberdeen Proving Ground, MD</i>	38	15.24	13	8.84	12	8.86	19	15.35	13	11.29
<i>Fort Belvoir, VA</i>	35	17.72	55	29.85	46	23.95	52	23.52	34	12.64
<i>Fort Bragg, NC</i>	575	13.00	770	16.69	648	13.63	455	9.23	622	12.83
<i>Fort Detrick, MD</i>	5	6.36	12	16.46	20	26.84	9	11.76	15	16.65
<i>Fort Dix, NJ</i>	1	13.46	2	19.58	0	0.00	0	0.00	4	14.57
<i>Fort Drum, NY</i>	199	12.09	172	10.05	143	8.06	272	14.97	139	7.35
<i>Fort Eustis, VA</i>	37	6.83	50	8.49	84	13.56	78	12.45	53	9.23
<i>Fort George G Meade, MD</i>	16	6.30	61	20.49	64	21.70	44	14.57	51	17.27
<i>Fort Knox, KY</i>	212	27.23	213	27.62	104	12.89	201	18.35	230	21.92
<i>Fort Lee, VA</i>	22	3.58	54	8.50	56	8.99	76	11.51	75	10.87
<i>Fort Myer, VA</i>	19	11.79	23	13.88	17	9.92	10	5.87	9	4.85
<i>Fort Monmouth, NJ</i>	5	10.49	3	7.03	4	10.20	2	5.99	1	4.95
<i>Walter Reed AMC, DC</i>	27	10.27	23	8.53	34	12.58	26	10.21	12	7.52
<i>West Point USMA, NY</i>	12	9.18	17	12.61	20	14.87	18	13.79	17	12.14
<b>SOUTHERN</b>										
<i>Fort Benning, GA</i>	387	20.54	506	25.25	362	17.38	238	11.51	245	11.20
<i>Fort Campbell, KY</i>	420	14.43	378	12.25	495	15.72	377	11.98	827	25.09
<i>Fort Gordon, GA</i>	44	5.49	63	7.40	54	5.92	45	4.96	65	8.02
<i>Fort Hood, TX</i>	427	8.22	883	16.66	701	13.35	568	12.23	464	10.05
<i>Fort Jackson, SC</i>	41	4.36	53	4.67	72	6.67	78	8.01	52	6.19
<i>Fort McPherson, GA</i>	18	12.32	29	19.55	21	13.20	32	21.35	20	35.87
<i>Fort Polk, LA</i>	98	13.41	102	12.44	233	27.48	198	22.37	344	39.69
<i>Fort Rucker, AL</i>	48	11.80	85	20.90	102	25.52	102	27.32	97	26.83
<i>Fort Sam Houston, TX</i>	96	13.54	140	19.28	117	15.53	122	15.41	168	21.57
<i>Fort Sill, OK</i>	135	11.07	166	14.63	225	21.12	186	13.94	142	11.84
<i>Fort Stewart, GA</i>	51	3.25	295	18.78	329	19.59	177	10.15	340	18.50
<i>Redstone Arsenal, AL</i>	12	12.31	9	9.32	21	19.09	19	15.40	20	18.61
<b>WESTERN</b>										
<i>Fort Bliss, TX</i>	146	10.13	261	16.04	323	17.32	514	24.97	599	24.44
<i>Fort Carson, CO</i>	363	23.51	328	19.25	359	18.33	360	15.37	443	17.33
<i>Fort Huachuca, AZ</i>	47	8.81	51	10.92	43	9.32	35	6.80	46	9.31
<i>Fort Irwin, CA</i>	37	8.96	60	14.91	64	15.79	58	13.50	92	21.29
<i>Fort Leavenworth, KS</i>	25	9.42	28	10.22	45	15.23	51	15.99	60	18.98
<i>Fort Leonard Wood, MO</i>	34	3.29	69	6.30	83	7.48	75	6.97	82	7.70
<i>Fort Lewis, WA</i>	466	18.72	528	18.90	516	17.10	324	10.41	550	17.72
<i>Fort Richardson, AK</i>	65	12.58	135	19.64	101	12.83	141	19.49	185	27.13
<i>Fort Riley, KS</i>	49	3.43	152	10.64	132	8.16	92	4.95	79	4.18
<i>Fort Wainwright, AK</i>	95	17.71	53	13.08	60	12.85	62	14.02	95	15.04
<b>PACIFIC</b>										
<i>Camp Carroll</i>	2	4.03	1	1.39	4	5.31	3	4.30	5	7.27
<i>Camp Casey</i>	17	2.97	12	2.11	16	2.67	9	1.58	13	2.45
<i>Camp Humphreys</i>	6	4.01	4	2.49	4	2.49	3	1.63	11	3.61
<i>Camp Long</i>	3	13.01	0	0.00	0	0.00	0	0.00	0	0.00
<i>Camp Stanley/Red Cloud</i>	0	0.00	3	10.03	2	5.04	0	0.00	1	9.47
<i>Japan</i>	2	3.75	4	6.39	11	15.06	12	17.06	3	4.07
<i>Schofield Barracks-Wheeler AAF</i>	68	4.83	325	21.45	342	21.52	198	12.47	241	14.14
<i>USA Hawaii</i>	2	5.85	3	13.21	7	30.71	6	24.15	7	26.45
<i>Yongsan Garrison</i>	15	4.08	11	2.98	26	7.11	18	4.71	27	5.75
<b>EUROPEAN</b>										
<i>Ansbach</i>	8	6.11	9	5.44	11	6.18	1	0.63	6	4.60
<i>Baden-Wuerttemberg</i>	65	9.51	48	7.79	39	6.93	47	10.60	37	8.11
<i>Bamberg</i>	8	3.06	6	3.09	20	9.52	30	13.57	86	23.91
<i>BeNeLux</i>	7	7.84	7	8.87	6	7.94	13	21.64	8	13.15
<i>Grafenwoehr</i>	21	14.81	17	7.34	40	12.61	28	12.02	32	13.24
<i>Kaiserslautern</i>	0	0.00	0	0.00	0	0.00	2	15.19	0	0.00
<i>Schweinfurt</i>	29	8.73	23	9.84	12	3.11	43	14.18	38	10.49
<i>Stuttgart</i>	0	0.00	0	0.00	1	5.94	0	0.00	3	16.24
<i>Vicenza</i>	13	5.28	43	15.47	29	11.53	21	8.20	70	25.88
<i>Wiesbaden</i>	12	5.97	11	6.08	18	11.28	25	14.96	24	12.77

1. Rate is provided per 1,000 person-years.

# **ARMY Regional Totals Counts & Rates , 2007-2011**

US ARMY SENSORINEURAL HEARING LOSS diagnoses , 2007-2011										
	2007		2008		2009		2010		2011	
	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>
NORTHERN	1,162	1.26	1,252	1.32	1,171	1.20	1,060	1.03	1,177	1.16
SOUTHERN	2,559	1.57	2,703	1.60	2,841	1.65	2,470	1.47	2,441	1.47
WESTERN	1,707	1.71	2,092	1.97	2,218	1.90	2,416	1.92	2,502	1.88
PACIFIC	545	2.11	539	1.98	676	2.39	596	2.10	669	2.18
EUROPEAN	219	1.05	153	0.77	230	1.07	227	1.24	309	1.50
US ARMY SIGNIFICANT THRESHOLD SHIFT diagnoses , 2007-2011										
	2007		2008		2009		2010		2011	
	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>
NORTHERN	1,363	1.43	981	1.01	1,553	1.56	1,206	1.16	1,587	1.55
SOUTHERN	5,260	3.17	6,499	3.84	5,388	3.17	4,430	2.67	3,150	1.92
WESTERN	1,890	1.84	2,318	2.14	1,944	1.63	2,369	1.86	5,762	4.34
PACIFIC	13	0.05	1	0.00	49	0.16	130	0.44	98	0.31
EUROPEAN	240	1.13	67	0.33	154	0.71	149	0.80	158	0.75
US ARMY NOISE-INDUCED HEARING LOSS diagnoses , 2007-2011										
	2007		2008		2009		2010		2011	
	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>
NORTHERN	406	0.43	494	0.51	325	0.32	424	0.40	417	0.40
SOUTHERN	681	0.41	597	0.34	717	0.40	474	0.27	275	0.16
WESTERN	345	0.34	501	0.45	545	0.45	154	0.12	318	0.23
PACIFIC	12	0.04	18	0.06	28	0.09	29	0.10	45	0.14
EUROPEAN	31	0.15	34	0.17	27	0.12	13	0.07	18	0.08
US ARMY TINNITUS diagnoses , 2007-2011										
	2007		2008		2009		2010		2011	
	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>
NORTHERN	1,203	1.28	1,468	1.52	1,252	1.27	1,262	1.21	1,275	1.23
SOUTHERN	1,777	1.07	2,709	1.57	2,732	1.56	2,142	1.25	2,784	1.64
WESTERN	1,327	1.30	1,665	1.53	1,726	1.44	1,712	1.33	2,231	1.64
PACIFIC	115	0.43	363	1.29	412	1.41	249	0.85	308	0.97
EUROPEAN	163	0.77	164	0.82	176	0.81	210	1.13	304	1.45

**US Army Noise-Induced Hearing Injuries, 2007-2011**

	2007		2008		2009		2010		2011	
	ANNUAL		ANNUAL		ANNUAL		ANNUAL		ANNUAL	
	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>
<b>Occupation (Army)</b>										
<i>Infantry, Gun Crew, and Seaman</i>	5,275	51.87	5,823	57.64	5,519	54.18	4,902	46.80	5,913	56.57
<i>Electronic Equipment Repairers</i>	606	27.42	620	26.40	667	26.63	688	23.87	752	29.20
<i>Communications and Intelligence Specialists</i>	1,590	33.53	1,848	39.07	1,702	37.08	1,506	32.60	1,882	38.94
<i>Health Care Specialists</i>	799	24.42	898	27.37	797	24.07	844	23.76	997	30.11
<i>Other Technical and Allied Specialists</i>	435	29.50	481	32.06	478	31.20	464	28.97	584	37.07
<i>Functional Support and Admin</i>	1,567	27.32	1,513	24.95	1,597	26.11	1,404	23.52	1,716	29.77
<i>Electrical/Mechanical Equip. Repairers</i>	1,862	33.62	1,935	34.77	1,848	33.64	1,528	29.25	1,856	33.71
<i>Craftswork &amp; Construction</i>	352	37.99	382	39.13	419	38.69	396	35.26	513	44.92
<i>Service, Transport &amp; Supply</i>	1,847	32.88	2,104	35.01	2,047	33.20	1,859	31.32	2,243	38.66
<i>Students &amp; Trainees</i>	82	37.04	132	50.75	130	45.57	125	37.80	56	19.69
<i>General/Flag. Off. &amp; Executives</i>	16	85.87	20	105.95	21	111.68	17	87.70	18	96.59
<i>Tactical Operations Officers</i>	720	27.40	801	30.25	842	31.68	819	30.33	829	30.25
<i>Intelligence Officers</i>	148	27.97	163	30.07	182	32.92	154	26.21	191	31.91
<i>Engineering &amp; Maintenance Officers</i>	387	31.15	332	28.08	368	30.24	389	31.07	392	30.83
<i>Scientists &amp; Professionals</i>	160	30.67	150	27.72	215	38.89	161	29.17	172	32.05
<i>Health Care Officers</i>	360	27.69	328	24.61	337	24.65	352	25.17	374	26.19
<i>Administrators</i>	158	30.21	157	27.81	187	30.96	194	30.96	201	31.48
<i>Supply &amp; Logistics Officers</i>	196	30.66	222	28.83	218	26.93	300	35.47	290	33.84
<i>Students, Trainees &amp; Other Officers</i>	51	20.08	64	27.25	68	31.14	58	26.83	67	22.87
<b>By Diagnosis</b>										
<i>DoD - SNHL</i>	9,784	7.64	9,368	7.27	9,492	7.29	9,823	7.51	10,050	7.74
<i>DoD - STS</i>	8,745	6.83	9,340	7.25	8,960	6.88	8,633	6.60	12,592	9.70
<i>DoD - NIHL</i>	2,518	1.97	1,820	1.41	1,605	1.23	1,114	0.85	1,055	0.81
<i>DoD - TINN</i>	6,724	5.25	7,637	5.93	8,035	6.17	8,390	6.41	9,675	7.45
<i>Army - SNHL</i>	5,422	11.40	5,116	10.51	5,307	10.77	5,095	10.21	4,785	9.64
<i>Army - STS</i>	7,777	16.35	8,694	17.86	8,131	16.50	7,409	14.84	9,902	19.95
<i>Army - NIHL</i>	996	2.09	995	2.04	970	1.97	635	1.27	645	1.30
<i>Army - TINN</i>	2,416	5.08	3,168	6.51	3,234	6.56	3,021	6.05	3,714	7.48
<b>Sex (Army)</b>										
<i>Male</i>	15,421	37.81	16,708	39.99	16,270	38.48	14,889	34.78	17,420	40.99
<i>Female</i>	1,190	17.57	1,265	18.36	1,372	19.65	1,271	17.89	1,626	22.80
<b>Age (Army)</b>										
<i>&lt;20</i>	693	16.39	712	17.36	691	19.75	519	14.32	754	21.00
<i>20-24</i>	4,858	29.49	5,629	33.93	5,187	31.74	4,706	28.78	5,760	35.69
<i>25-29</i>	3,727	35.05	4,028	35.60	4,052	33.48	3,813	30.71	4,456	35.94
<i>30-34</i>	2,250	33.22	2,370	34.64	2,380	33.42	2,124	28.85	2,644	35.27
<i>35-39</i>	2,302	41.12	2,359	41.18	2,317	40.26	2,064	36.62	2,220	41.09
<i>&gt;=40</i>	2,781	72.18	2,875	70.26	3,015	67.85	2,934	64.90	3,212	69.78
<b>Deployment Association<sup>2</sup> (Army)</b>										
<b>COUNTS ONLY</b>										
<i>OIF-associated</i>	2,521		5,570		4,670		3,082		2,151	
<i>OEF-associated</i>	289		459		822		1,763		2,320	
<i>Not Deployment Associated</i>	13,801		11,944		12,150		11,315		14,575	

1. Rate is provided per 1,000 person-years.

2. The diagnosis occurred during or within 180 days of a deployment.

**US Armed Forces Noise-Induced Hearing Injuries, Active Component, 2007-2011**

	2007		2008		2009		2010		2011	
	ANNUAL		ANNUAL		ANNUAL		ANNUAL		ANNUAL	
	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>	Count	Rate <sup>1</sup>
<b>Occupation</b>										
<i>Infantry, Gun Crew, and Seaman</i>	6,575	34.24	7,203	36.97	6,973	37.41	6,430	36.01	8,037	46.00
<i>Electronic Equipment Repairers</i>	1,402	16.55	1,280	15.39	1,295	15.24	1,384	14.92	1,692	18.44
<i>Communications and Intelligence Specialists</i>	2,196	20.96	2,424	23.19	2,264	21.99	2,110	20.49	2,780	25.10
<i>Health Care Specialists</i>	1,392	18.56	1,471	19.90	1,372	18.44	1,484	19.12	1,651	21.75
<i>Other Technical and Allied Specialists</i>	712	21.31	815	23.45	847	23.88	859	23.75	1,033	28.80
<i>Functional Support and Admin</i>	2,846	17.30	2,706	16.49	2,800	17.14	2,673	16.91	3,141	21.12
<i>Electrical/Mechanical Equip. Repairers</i>	4,164	19.09	4,021	18.59	3,807	17.59	3,902	17.89	4,582	21.01
<i>Craftwork &amp; Construction</i>	827	21.52	746	20.06	808	21.37	805	21.00	1,140	30.07
<i>Service, Transport &amp; Supply</i>	2,429	22.87	2,639	23.91	2,937	22.96	3,001	21.98	3,689	27.54
<i>Students &amp; Trainees</i>	957	16.72	610	9.59	552	8.55	561	9.62	428	7.39
<i>General/Flag. Off. &amp; Executives</i>	89	62.73	79	55.71	90	63.17	79	54.63	112	79.03
<i>Tactical Operations Officers</i>	1,394	18.59	1,504	20.19	1,505	20.07	1,644	21.51	1,839	23.75
<i>Intelligence Officers</i>	249	20.93	269	22.32	297	24.15	268	20.72	328	24.65
<i>Engineering &amp; Maintenance Officers</i>	730	24.83	594	21.30	681	24.27	766	27.12	780	27.92
<i>Scientists &amp; Professionals</i>	274	23.19	269	22.67	329	27.34	281	22.83	295	24.04
<i>Health Care Officers</i>	721	22.59	723	22.52	729	22.46	734	22.43	797	23.92
<i>Administrators</i>	307	23.81	271	20.89	305	22.47	360	26.23	374	27.36
<i>Supply &amp; Logistics Officers</i>	373	22.71	386	22.36	361	20.72	480	26.91	500	28.00
<i>Students, Trainees &amp; Other Officers</i>	134	8.84	155	9.97	140	8.94	139	8.98	174	11.25
<b>By Diagnosis</b>										
<i>DoD - SNHL</i>	9,784	7.64	9,368	7.27	9,492	7.29	9,823	7.51	10,050	7.74
<i>DoD - STS</i>	8,745	6.83	9,340	7.25	8,960	6.88	8,633	6.60	12,592	9.70
<i>DoD - NIHL</i>	2,518	1.97	1,820	1.41	1,605	1.23	1,114	0.85	1,055	0.81
<i>DoD - TINN</i>	6,724	5.25	7,637	5.93	8,035	6.17	8,390	6.41	9,675	7.45
<i>Army - SNHL</i>	5,422	11.40	5,116	10.51	5,307	10.77	5,095	10.21	4,785	9.64
<i>Army - STS</i>	7,777	16.35	8,694	17.86	8,131	16.50	7,409	14.84	9,902	19.95
<i>Army - NIHL</i>	996	2.09	995	2.04	970	1.97	635	1.27	645	1.30
<i>Army - TINN</i>	2,416	5.08	3,168	6.51	3,234	6.56	3,021	6.05	3,714	7.48
<i>Air Force - SNHL</i>	1,956	6.21	1,726	5.64	1,664	5.40	1,666	5.37	1,592	5.16
<i>Air Force - STS</i>	312	0.99	344	1.12	221	0.72	512	1.65	473	1.53
<i>Air Force - NIHL</i>	383	1.22	244	0.80	193	0.63	145	0.47	118	0.38
<i>Air Force - TINN</i>	2,540	8.06	2,419	7.90	2,489	8.07	2,762	8.89	2,722	8.82
<i>Navy - SNHL</i>	1,439	4.58	1,360	4.41	1,256	4.09	1,406	4.60	1,375	4.54
<i>Navy - STS</i>	623	1.98	236	0.76	87	0.28	149	0.49	908	3.00
<i>Navy - NIHL</i>	870	2.77	420	1.36	250	0.81	197	0.65	161	0.53
<i>Navy - TINN</i>	1,146	3.65	1,319	4.27	1,480	4.82	1,531	5.01	1,875	6.19
<i>Marine Corps - SNHL</i>	967	5.51	1,166	6.24	1,265	6.51	1,656	8.56	2,298	12.07
<i>Marine Corps - STS</i>	33	0.19	66	0.35	521	2.68	563	2.91	1,309	6.87
<i>Marine Corps - NIHL</i>	269	1.53	161	0.86	192	0.99	137	0.71	131	0.69
<i>Marine Corps - TINN</i>	622	3.55	731	3.91	832	4.28	1,076	5.56	1,364	7.16
<b>Sex</b>										
<i>Male</i>	25,524	23.40	25,873	23.55	25,663	23.12	25,606	23.00	30,453	27.62
<i>Female</i>	2,247	11.86	2,292	12.09	2,429	12.62	2,354	12.07	2,919	14.91
<b>Age</b>										
<i>&lt;20</i>	1,261	10.37	1,048	8.57	971	8.81	852	8.11	1,065	10.33
<i>20-24</i>	7,401	16.24	7,896	17.29	7,729	16.77	7,521	16.25	9,617	21.13
<i>25-29</i>	5,623	20.29	5,801	20.27	5,845	19.37	5,952	19.18	7,342	23.34
<i>30-34</i>	3,457	19.60	3,545	20.16	3,503	19.45	3,414	18.55	4,338	23.24
<i>35-39</i>	3,968	27.26	3,960	27.53	3,865	27.08	3,750	26.88	4,111	30.59
<i>&gt;=40</i>	6,061	58.33	5,915	57.18	6,179	57.93	6,471	60.58	6,899	66.07
<b>Deployment Association<sup>2</sup> (DoD)</b>										
<b>COUNTS ONLY</b>										
<i>OIF-associated</i>	3,509		6,650		5,727		3,728		2,646	
<i>OEF-associated</i>	425		737		1,253		2,808		3,943	
<i>Not Deployment Associated</i>	23,837		20,778		21,112		21,424		26,783	

1. Rate is provided per 1,000 person-years.

2. The diagnosis occurred during or within 180 days of a deployment.